

We Claim:

1. A method of treating an animal carcass to reduce a microbial population in resulting cut meat, the method comprising the steps of:

(a) treating said carcass with an antimicrobial composition comprising:

(i) an effective antimicrobial amount comprising at least 2 ppm of one or more mono- or di-peroxycarboxylic acids having up to 12 carbon atoms; and

(ii) an effective antimicrobial amount comprising at least 20 ppm of one or more carboxylic acids having up to 18 carbon atoms; and

(b) reducing the microbial population.

2. The method of claim 1 wherein the population reduction comprises at least one \log_{10} reduction in the microbial population.

3. The method of claim 1 wherein the population reduction comprises at least two \log_{10} reduction in the microbial population.

4. The method of claim 1 wherein the population reduction comprises at least three \log_{10} reduction in the microbial population.

5. The process of claim 2 wherein the population comprises a human pathogen.

6. The process of claim 4 wherein the population comprises *Escherichia coli*.

7. The method of claim 1 wherein the carcass is selected from a muscle meat including beef, pork, veal, buffalo or lamb.

8. The method of claim 1 wherein the carcass is sea food including scallops, shrimp, crab, octopus, mussels, squid or lobster.

5 9. The method of claim 1 wherein the carcass is poultry including chicken, turkey, ostrich, game hen, squab or pheasant.

10 10. The method of claim 1 wherein the peroxycarboxylic acid comprises one or more peroxycarboxylic acids having from 2 to 4 carbon atoms and a peroxycarboxylic acid having from 8 to 12 carbon atoms.

11. The method of claim 7 wherein the peroxycarboxylic acid comprises peroxyacetic acid and peroxyoctanoic or peroxydecanoic acid, or mixtures thereof.

15 12. The method of claim 10 wherein the peroxycarboxylic acid having from 2 to 4 carbon atoms is peroxyacetic acid and the peroxycarboxylic acid having from 8 to 12 carbon atoms is peroxyoctanoic acid resulting in a ratio of about 10 to about 1 parts by weight of peroxyacetic acid per each 1 part of carboxylic acid.

20 13. The method of claim 1 wherein the carboxylic acid is acetic acid.

14. The method of claim 1 wherein the carboxylic acid is an alpha-hydroxy mono or dicarboxylic acid having from 3 to 6 carbon atoms.

25 15. The method of claim 14 wherein the carboxylic acid is lactic acid.

16. The method of claim 1 wherein said antimicrobial composition comprises about 2 to 25 parts by weight of hydrogen peroxide per each one million parts of the composition.

17. The method of claim 1 wherein said antimicrobial composition is applied to the carcass by means of a spray.

18. The method of claim 1 wherein said antimicrobial composition is applied to the carcass by means of a fog.

19. The method of claim 1 wherein said antimicrobial composition is applied to the carcass by means of a foam.

20. The method of claim 1 wherein said antimicrobial composition is applied to the carcass by applying in the form of a thickened or gelled solution.

21. The method of claim 1 wherein all or part of the carcass is dipped in said antimicrobial composition.

22. The method of claim 21 wherein a solution comprising the antimicrobial composition is agitated.

23. The method of claim 1 which further includes a vacuum treatment step.

24. The method of claim 1 which further includes the step of applying an activated light source to said carcass.

25. An antimicrobial composition adapted for cleaning and sanitizing animal carcasses comprising:

(a) about 0.5 wt-% to about 20 wt-% of a mixture of one or more peroxycarboxylic acids having from 2 to 4 carbon atoms and one or more peroxycarboxylic acids having from 8 to 12 carbon atoms;

(b) from about 0.5 wt-% to about 60 wt-% of an alpha-hydroxy mono or dicarboxylic acid having from 3 to 6 carbon atoms

- (c) an effective amount of a sequestrant; and
- (d) an effective amount of a hydrotrope.

26. The composition of claim 25 wherein the peroxycarboxylic acid is a
5 mixture of peroxyacetic acid and peroxyoctanoic or peroxydecanoic acid.

27. The composition of claim 26 wherein the peroxycarboxylic acid is a
mixture of peroxyacetic acid and peroxyoctanoic acid in a ratio of about 10:1 to about
1:1.

10

28. The composition of claim 25 wherein the alpha-hydroxy mono- or
dicarboxylic acid is lactic acid.

29. The composition of claim 25 which further comprises about 1 wt-% to
15 about 35 wt-% of hydrogen peroxide.

30. The composition of claim 25 which further comprises from about 0.01
wt-% to about 10 wt-% of a sequestering agent.

20 31. The composition of claim 30 wherein the sequestering agent is 1-
hydroxyethylidene-1,1-diphosphonic acid.

32. The composition of claim 25 which further comprises from about 0.1 to
about 20 wt-% of a hydrotrope.

25

33. The composition of claim 25 which further comprises from about 0.01 to
about 10 wt-% of a thickening or gelling agent.

34. The composition of claim 25 which further comprises from about 1 to
30 about 60 wt-% of an organic solvent.

35. An antimicrobial composition adapted for treating animal carcasses consisting essentially of:

- 5 (a) a mixture of peroxyacetic and peroxyoctanoic acid in a ratio of about 10:1 to about 1:1;
- (b) from about 0.1 wt-% to about 10 wt-% of lactic acid;
- (c) from about 4 wt-% to about 10 wt-% of hydrogen peroxide; and
- (d) from about 0.5 wt-% to about 1.5 wt-% of a sequestering agent.

10 36. The composition of claim 35 wherein the sequestering agent is the sequestering agent is 1-hydroxyethylidene-1,1-diphosphonic acid.

37. A method of treating an animal carcass to reduce a microbial population in resulting cut meat, the method comprising the steps of:

- 15 (a) spraying an aqueous antimicrobial treatment composition onto said carcass at a pressure of at least 50 psi at a temperature of up to about 60°C resulting in a contact time of at least 30 seconds, the antimicrobial composition comprising an effective antimicrobial amount comprising least 2 ppm of one or more carboxylic acid, peroxy-carboxylic acid or mixtures thereof; and
- 20 (b) achieving at least a one log₁₀ reduction in the microbial population.

38. The method of claim 37 wherein the antimicrobial composition comprises an effective antimicrobial amount comprising at least 2 ppm of one or more peroxy-carboxylic acids having up to 12 carbon atoms; and at least 20 parts of one or

25 more carboxylic acids having up to 18 carbon atoms.

39. The method of claim 37 wherein the peroxy-carboxylic acid comprises peroxyacetic acid, peroxyoctanoic acid, peroxydecanoic acid or mixtures thereof.

3 40. The method of claim 37 wherein the carboxylic acid comprises acetic acid, lactic acid or mixtures thereof.

4 41. The method of claim 37 wherein the antimicrobial composition
5 comprises at least about 5 wt% hydrogen peroxide.

5 42. The method of claim 37 wherein the antimicrobial compositions are applied by means of an electrostatically accelerated spray.

10 43. A method of treating an animal carcass to reduce a microbial population in resulting cut meat, the method comprising the steps of:
placing the carcass in a chamber at atmospheric pressure;
filling the chamber with condensing steam comprising an antimicrobial composition for a short duration; and
15 quickly venting and cooling the chamber to prevent browning of the meat carcass; wherein the duration of the steam thermal process may be from about 5 seconds to about 30 seconds and the chamber temperature may reach from about 50 °C to about 93°C.

20 44. The method of claim 43 wherein the antimicrobial composition comprises an effective antimicrobial amount comprising at least 2 ppm of one or more peroxycarboxylic acids having up to 12 carbon atoms; and at least 20 parts of one or more carboxylic acids having up to 18 carbon atoms.

B 25 45. The method of claim 44 wherein the peroxycarboxylic acid comprises peroxyacetic acid, peroxyoctanoic acid, peroxydecanoic acid or mixtures thereof.

B 46. The method of claim 44 wherein the carboxylic acid comprises acetic acid, lactic acid or mixtures thereof.

9 ~~47~~. The method of claim ~~44~~ wherein the antimicrobial composition comprises at least about 5 wt% hydrogen peroxide.

5 10 ~~48~~. The method of claim ~~44~~ wherein the antimicrobial compositions are applied by means of an electrostatically accelerated spray.

48